TTR gene

transthyretin

Normal Function

The *TTR* gene provides instructions for producing a protein called transthyretin. This protein transports vitamin A (retinol) and a hormone called thyroxine throughout the body. To transport thyroxine, four transthyretin proteins must be attached (bound) to each other to form a four-protein unit (tetramer). To transport retinol, transthyretin must form a tetramer and also bind to retinol binding protein. Transthyretin is produced primarily in the liver. A small amount of this protein is produced in an area of the brain called the choroid plexus and in the light-sensitive tissue that lines the back of the eye (the retina).

Health Conditions Related to Genetic Changes

transthyretin amyloidosis

More than 100 mutations in the *TTR* gene have been found to cause transthyretin amyloidosis. Nearly all of these mutations change one protein building block (amino acid) in the transthyretin protein. The most common mutation found in people with transthyretin amyloidosis replaces the amino acid valine with the amino acid methionine at position 30 in the transthyretin protein (written as Val30Met or V30M). This mutation is seen most commonly in the Portuguese and Swedish populations, although it is found in affected people worldwide. Another common mutation replaces the amino acid valine with the amino acid isoleucine at position 122 in the transthyretin protein (written as Val122Ile or V122I). It is estimated that 3 percent to 3.9 percent of African Americans and 5 percent of some West African populations have this mutation.

Most of the *TTR* gene mutations that cause transthyretin amyloidosis are thought to alter the structure of transthyretin, impairing its ability to bind to other transthyretin proteins and altering its normal function.

other disorders

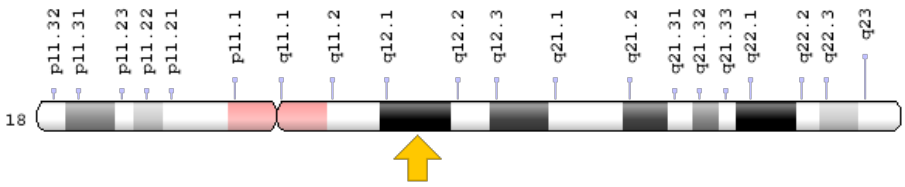
In elderly people, deposits of transthyretin protein cause a condition called senile systemic amyloidosis. People with this condition do not have a mutation in the *TTR* gene; for reasons that are unclear, the transthyretin protein abnormally begins to form protein deposits. The most common place for amyloidosis in people with this condition is the heart, causing slowly progressive heart failure. Other sites of

amyloidosis may include the lungs, blood vessels, and kidneys. It is estimated that 10 percent to 25 percent of people older than 80 have senile systemic amyloidosis.

Chromosomal Location

Cytogenetic Location: 18q12.1, which is the long (q) arm of chromosome 18 at position 12.1

Molecular Location: base pairs 31,591,767 to 31,599,024 on chromosome 18 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- ATTR
- PALB
- prealbumin, amyloidosis type I
- TBPA
- TTHY_HUMAN

Additional Information & Resources

Educational Resources

- Neuromuscular Disease Center, Washington University
  http://neuromuscular.wustl.edu/nother/amyloid.htm#transthyretin

GeneReviews

- Familial Transthyretin Amyloidosis
  https://www.ncbi.nlm.nih.gov/books/NBK1194

Scientific Articles on PubMed

- PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28TTR%5BTI%5D%29+OR+%28transthyretin%5BTI%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+720+days%22%5Bdp%5D

OMIM

- TRANSTHYRETIN
  http://omim.org/entry/176300

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
  http://atlasgeneticsoncology.org/Genes/GC_TTR.html
- ClinVar
  https://www.ncbi.nlm.nih.gov/clinvar?term=TTR%5Bgene%5D
- HGNC Gene Family: Gla domain containing
  http://www.genenames.org/cgi-bin/genefamilies/set/1250
- HGNC Gene Symbol Report
  http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=12405
- NCBI Gene
  https://www.ncbi.nlm.nih.gov/gene/7276
- UniProt
  http://www.uniprot.org/uniprot/P02766

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